86-4042

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

POTENTIOMETRIC MAP OF THE COCKFIELD AQUIFER IN MISSISSIPPI, FALL 1984

By Daphne Darden

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WATER-RESOURCES INVESTIGATIONS REPORT 86-4042

Jackson, Mississippi

1986

Prepared in cooperation with the

MISSISSIPPI DEPARTMENT OF NATURAL RESOURCES
BUREAU OF LAND AND WATER RESOURCES

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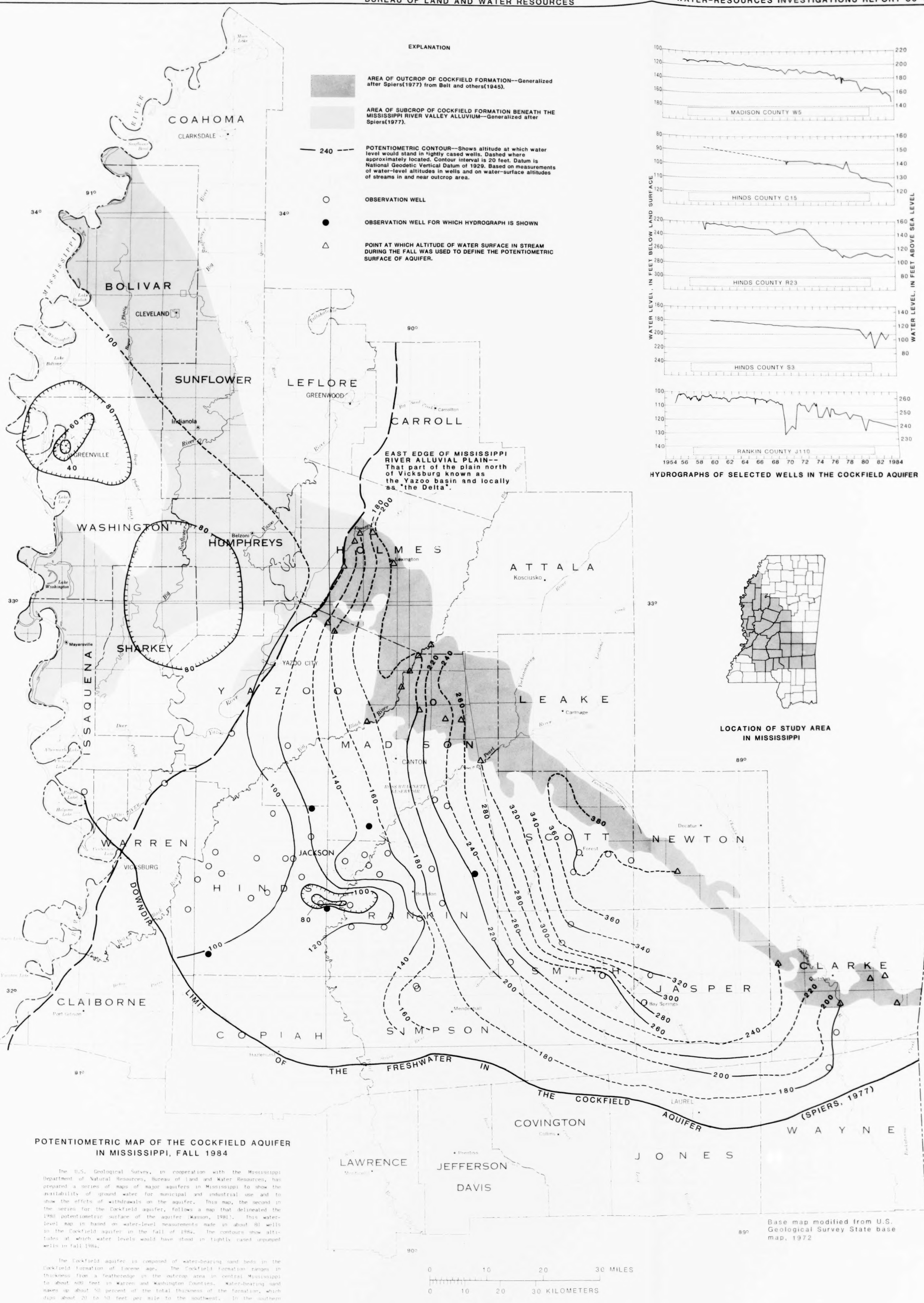

MADISON COUNTY W5
HINDS COUNTY C15
HINDS COUNTY R23
HINDS COUNTY S3
RANKIN COUNTY J110
WATER LEVEL, IN FEET BELOW LAND SURFACE
WATER LEVEL, IN FEET ABOVE SEA LEVEL
1954 56 58 60 62 64 66 68 70 72 74 76 78 80 82 1984

HYDROGRAPHS OF SELECTED WELLS IN THE COCKFIELD AQUIFER

LOCATION OF STUDY AREA IN MISSISSIPPI

POTENTIOMETRIC MAP OF THE COCKFIELD AQUIFER IN MISSISSIPPI, FALL 1984

The U.S. Geological Survey, in cooperation with the Mississippi Department of Natural Resources, Bureau of Land and Water Resources, has prepared a series of maps of major aquifers in Mississippi to show the availability of ground water for municipal and industrial use and to show the effects of withdrawals on the aquifer. This map, the second in the series for the Cockfield aquifer, follows a map that delineated the 1980 potentiometric surface of the aquifer (Wasson, 1981). This water-level map is based on water-level measurements made in about 80 wells in the Cockfield aquifer in the fall of 1984. The contours show altitudes at which water levels would have stood in tightly cased unpumped wells in fall 1984.

The Cockfield aquifer is composed of water-bearing sand beds in the Cockfield Formation of Eocene age. The Cockfield Formation ranges in thickness from a featheredge in the outcrop area in central Mississippi to about 600 feet in Warren and Washington Counties. Water-bearing sand makes up about 50 percent of the total thickness of the formation, which dips about 20 to 50 feet per mile to the southwest. In the southern part of the study area, the aquifer is confined by clay of the underlying Cook Mountain formation; north of Yazoo County, however, the clay becomes sandy and less confining. South of the outcrop area (see map) the Cockfield aquifer is confined by the overlying Yazoo Clay of the Jackson Group. In the alluvial plain in northwestern Mississippi, the aquifer is hydraulically connected with the overlying Mississippi River alluvial aquifer except in areas where the Yazoo Clay is present. The Cockfield aquifer is not directly connected hydraulically with the Mississippi River. The aquifer is exposed at the surface about 50 miles southwest of the outcrop as an inlier on the Jackson Dome.

Precipitation recharges the Cockfield aquifer in the outcrop area from Clarke County to Holmes County and in the small inlier area along the Pearl River at Jackson. The regional ground-water movement -- southwestward from the outcrop area -- has been modified by large centers of pumping in Greenville and Jackson. As water moves downdip from the outcrop, mineralization increases. The approximate downdip extent of freshwater in the Cockfield aquifer (see map), is about 50 to 70 miles southwest of the outcrop area.

The Cockfield aquifer contains freshwater (less than 1,000 milligrams per liter of dissolved solids) in all or parts of 27 counties in Mississippi. The aquifer is the source of ground water for many large industrial and municipal wells and small domestic and stock wells.

In and near the outcrop area, water levels in the Cockfield aquifer have been stable since 1980. In the west where the aquifer is confined, water levels have declined about one-half foot per year. The largest declines, about 2 feet per year since 1980, have occurred in the Jackson area, whereas water levels in the Greenville area have recovered about 2 feet per year since 1980 (see hydrographs). Where the Cockfield Formation is directly overlain by the Mississippi River valley alluvium, water levels in both aquifers are at about the same altitude.

ADDITIONAL INFORMATION

The map showing the results of the fall 1984 water-level measurements for the Cockfield aquifer is the second map showing ground-water levels in the aquifer. These maps are part of a series of maps that show water levels in the major aquifers in Mississippi. Data describing the individual wells used in this study may be obtained from the following:

Director
Mississippi Department of Natural Resources
Bureau of Land and Water Resources
P.O. Box 10631
Jackson, Mississippi 39209
(601) 961-5200

District Chief
U.S. Geological Survey
Water Resources Division
100 West Captiol Street
Federal Building, Suite 710
Jackson, Mississippi 39269
(601) 965-4600

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SELECTED REFERENCES

Harvey, E. J., Callahan, J. A., and Wasson, B. E., 1964, Ground-water resources of Hinds, Madison, and Rankin Counties, Mississippi: Mississippi Board of Water Commissioners Bulletin 64-1, 38 p.

Spiers, C. A., 1977, The Cockfield aquifer in Mississippi: Water-Resources Investigations Report 77-17, map.

Spiers, C. A., and Dalsin, G. J., 1979, Water for municipal and industrial development in Hinds, Madison, and Rankin Counties, Mississippi: Mississippi Research and Development Center Bulletin, 78 p.

Wasson, B. E., 1981, Potentiometric map of the Cockfield aquifer in Mississippi, Fall 1980: U.S. Geological Survey Water-Resources Investigations Map WI-1051, 1 sheet.

Base map modified from U.S. Geological Survey State base map, 1972

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